

**ARM Cortex™-M0
32-BIT MICROCONTROLLER****NuTiny-SDK-AU9110 User Manual
For NuMicro™ AU9110**

The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.

Nuvoton is providing this document only for reference purposes of NuMicro™ microcontroller based system design. Nuvoton assumes no responsibility for errors or omissions.

All data and specifications are subject to change without notice.

For additional information or questions, please contact: Nuvoton Technology Corporation.

1	Overview.....	3
2	NuTiny-SDK-AU9110 Introduction	3
2.1	NuTiny-SDK-AU9110 Jumper Description	5
2.2	Power setting of AU9110 chip	6
2.3	NuTiny-SDK-AU9110 PCB Placement.....	7
3	How to start NuTiny-SDK-AU9110 on the Keil μ Vision IDE	8
3.1	Keil μ Vision IDE Software Download and Install	8
3.2	Installing Nuvoton Nu-Link Driver.....	8
3.3	Hardware Setup	8
3.4	Run a sample project on Keil platform	9
4	How to Start NuTiny-SDK-AU9110 on the IAR Embedded Workbench.....	11
4.1	IAR Embedded Workbench Software Download and Install	11
4.2	Nuvoton Nu-Link Driver Download and Install.....	11
4.3	Hardware Setup	11
4.4	Run a sample project on IAR platform	12
5	NuTiny-SDK-AU9110 Schematic.....	13
5.1	NuTiny-EVB-AU9110 Schematic.....	13
5.2	Nu-Link-Me Schematic.....	14
6	To Download NuMicro™ Family Related Files from Nuvoton Company Website...	15
7	Revision History.....	16

1 Overview

NuTiny-SDK-AU9110 is the specific development tool for AU9110 chip. Users can use NuTiny-SDK-AU9110 to develop and verify the application program easily.

NuTiny-SDK-AU9110 includes 2 portions. One is NuTiny-EVB-AU9110 and the other is Nu-Link-Me. NuTiny-EVB-AU9110 is the evaluation board and Nu-Link-Me is its ICE adaptor. Thus, users do not need other additional ICE or debug equipment.

2 NuTiny-SDK-AU9110 Introduction

The Figure 1 and Figure 2 show the top side and bottom side of NuTiny-SDK-AU9110 respectively. The left portion of NuTiny-SDK-AU9110 is called NuTiny-EVB-AU9110, which uses the AU9110LF3AN as the target microcontroller. And the right portion is ICE adaptor called Nu-Link-Me.

NuTiny-EVB-AU9110 is similar to other development board. Users can use it to develop and verify applications to emulate the real behavior. The NuTiny-EVB-AU9110 can be a real system controller to design user target system.

Nu-Link-Me is an ICE adaptor. **The Nu-Link-Me ICE Adaptor connects your PC's USB port to your target system (via Serial Wired Debug Port) and allows you to program and debug embedded programs on the target hardware.** To use Nu-Link-Me ICE adaptor with IAR or Keil, please refer to "Nuvoton NuMicro™ IAR ICE driver user manual" or "Nuvoton NuMicro™ Keil ICE driver user manual" in detail. These 2 documents will be stored in local hard disk when user installs each driver.

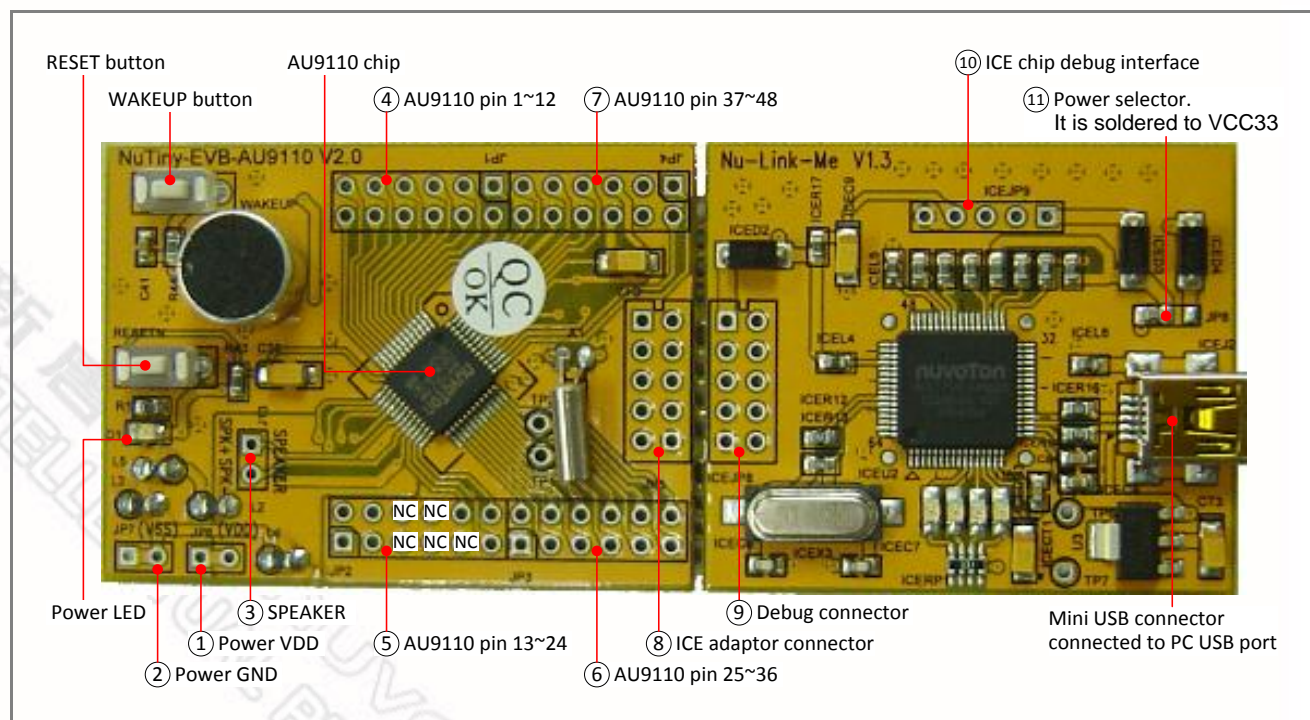


Figure 1: NuTiny-SDK-AU9110 top side.

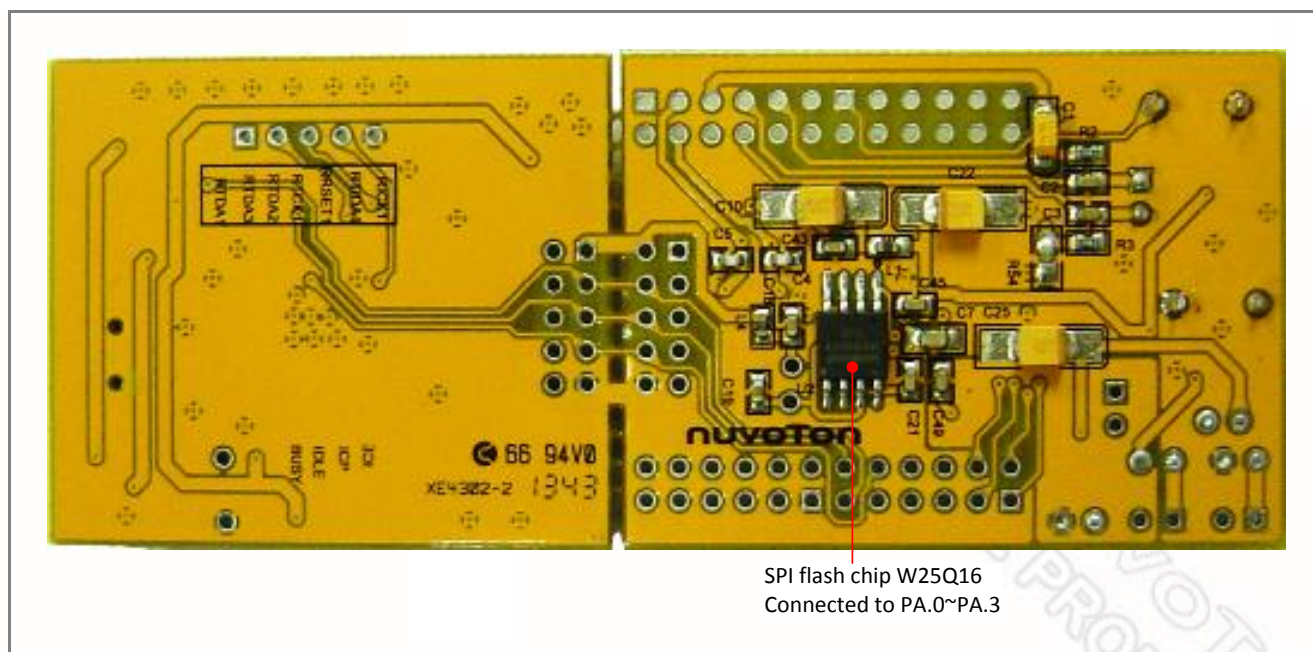



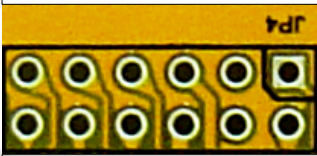


Figure 2: NuTiny-SDK-AU9110 bottom side.

2.1 NuTiny-SDK-AU9110 Jumper Description

Board	Component Name	Description	Remark																													
NuTiny-EVB-Au9110	① JP6	Power VDD input connector	Can be DC 2.4V-5.5V																													
	② JP7	Power GND input connector																														
	③ SPEAKER	Speaker connector																														
	④ JP1	AU9110 pin extension connector	<div>AU9110 pin number</div> <div><table><tr><td>1</td></tr><tr><td>1 9 7 5 3 1</td></tr></table><table><tr><td>1 1</td></tr><tr><td>2 0 8 6 4 2</td></tr></table></div>	1	1 9 7 5 3 1	1 1	2 0 8 6 4 2																									
	1																															
	1 9 7 5 3 1																															
1 1																																
2 0 8 6 4 2																																
⑤ JP2	AU9110 pin extension connector	<div>AU9110 pin number</div> <div><table><tr><td>1</td><td>1</td><td></td><td></td><td>2</td><td>2</td></tr><tr><td></td><td></td><td>NC</td><td>NC</td><td></td><td></td></tr><tr><td>4</td><td>6</td><td></td><td></td><td>2</td><td>4</td></tr></table><table><tr><td>1</td><td>1</td><td></td><td></td><td></td><td>2</td></tr><tr><td>3</td><td>5</td><td>NC</td><td>NC</td><td>NC</td><td>3</td></tr></table></div>	1	1			2	2			NC	NC			4	6			2	4	1	1				2	3	5	NC	NC	NC	3
1	1			2	2																											
		NC	NC																													
4	6			2	4																											
1	1				2																											
3	5	NC	NC	NC	3																											
⑥ JP3	AU9110 pin extension connector	<div>AU9110 pin number</div> <div><table><tr><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>6</td><td>8</td><td>0</td><td>2</td><td>4</td><td>6</td></tr></table><table><tr><td>2</td><td>2</td><td>2</td><td>3</td><td>3</td><td>3</td></tr><tr><td>5</td><td>7</td><td>9</td><td>1</td><td>3</td><td>5</td></tr></table></div>	1	1	2	2	2	2	6	8	0	2	4	6	2	2	2	3	3	3	5	7	9	1	3	5						
1	1	2	2	2	2																											
6	8	0	2	4	6																											
2	2	2	3	3	3																											
5	7	9	1	3	5																											

	⑦ JP4	AU9110 pin extension connector	<div><div>AU9110 pin number</div><table><tr><td>4</td><td>4</td><td>4</td><td>4</td><td>3</td><td>3</td></tr><tr><td>7</td><td>5</td><td>3</td><td>1</td><td>9</td><td>7</td></tr></table><div></div><table><tr><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>3</td></tr><tr><td>8</td><td>6</td><td>4</td><td>2</td><td>0</td><td>8</td></tr></table></div>	4	4	4	4	3	3	7	5	3	1	9	7	4	4	4	4	4	3	8	6	4	2	0	8
4	4	4	4	3	3																						
7	5	3	1	9	7																						
4	4	4	4	4	3																						
8	6	4	2	0	8																						
	⑧ JP5	ICE adaptor connector	For connecting with Nuvoton ICE adaptor (Nu-Link-Me).																								
Nu-Link-Me	⑨ ICEJP8	Debug connector	For connecting with a target board (for example, NuTiny-EVB-Au9110).																								
	⑩ ICEJP9	ICE chip debug interface	Only used to fix the firmware of ICE chip. User does not need to care.																								
	⑪ JP8	Power selector (VCC5 or VCC3.3) of ICE chip	It is soldered to VCC3.3 at factory.																								

2.2 Power setting of AU9110 chip

The input power of NuTiny-EVB-AU9110 can have two sources. One is from Nu-Link-Me through ⑧JP5 (ICE adaptor connector) and the other is from (JP6, JP7).

The AU9110 chip is powered by ICE adaptor which provides 3.3V by soldering JP8 at factory, when NuTiny-EVB-AU9110 is connected to ICE adaptor (Nu-Link-Me).

However if the NuTiny-EVB-AU9110 is separated alone, the AU9110 chip is powered by (JP6, JP7). DC2.4V~5.5V is applicable from (JP6, JP7). Figure 3 shows the power setting for a separate NuTiny-EVB-AU9110.

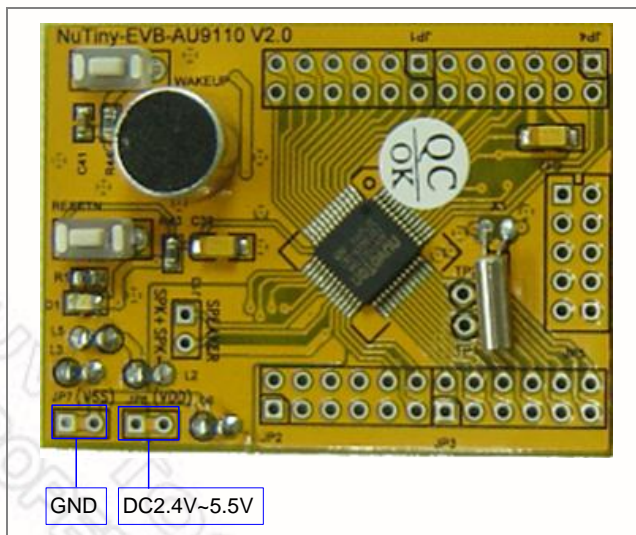
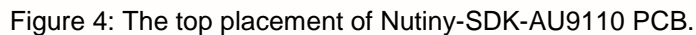


Figure 3: The power setting for a separate NuTiny-EVB-AU9110..

User can refer to Figure 4 for top placement of the NuTiny-SDK-AU9110 PCB, and Figure 5 for the bottom placement.



3 How to start NuTiny-SDK-AU9110 on the Keil μ Vision IDE

3.1 Keil μ Vision IDE Software Download and Install

Please visit the Keil company website (<http://www.keil.com>) to download the MDK-ARM software, which supports the Keil μ Vision IDE. The μ Vision IDE from Keil combines project management, make facilities, source code editing, program debugging, and complete simulation in one powerful environment.

The example codes for AU9110 are prepared by Nuvoton and called AU9110_BSP. They are well tested on MDK-ARM V4.72a. So the later version after MDK-ARM V4.72a is suggested to develop the project for AU9110.

3.2 Installing Nuvoton Nu-Link Driver

Please visit Nuvoton company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download Nu-Link driver for Keil μ Vision IDE. Please refer to the Chapter 6 for the detail download flow. When the Nu-Link driver have been download ok, please unzip the file and then execute the “Nu-Link_Driver_for_Keil_RVMDK_vx.xx.xxxx.exe” to install the driver, where the vx.xx.xxxx represents the version number of driver.

3.3 Hardware Setup

The hardware setup is shown in the following Figure 6.

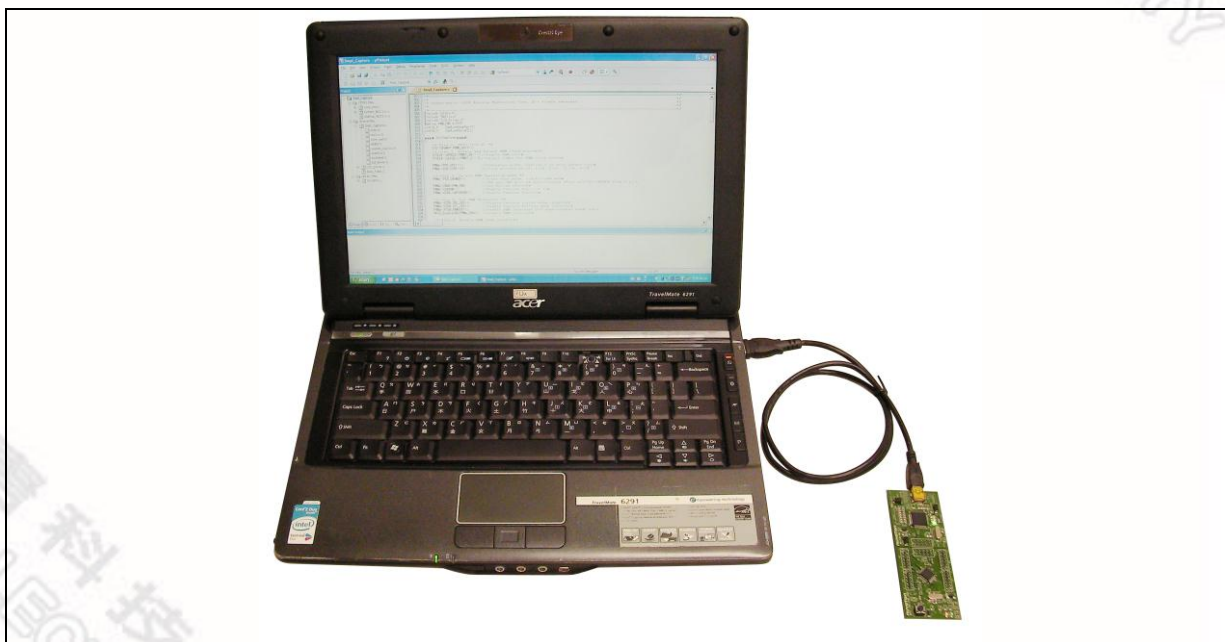


Figure 6: NuTiny-SDK-AU9110 Hardware Setup.

3.4 Run a sample project on Keil platform

The example code for AU9110 is called AU9110_BSP, It is delivered on CD. When you already install AU9110_BSP in your PC, you can find a keil subfolder in every sample project folder which is shown in Figure 7.

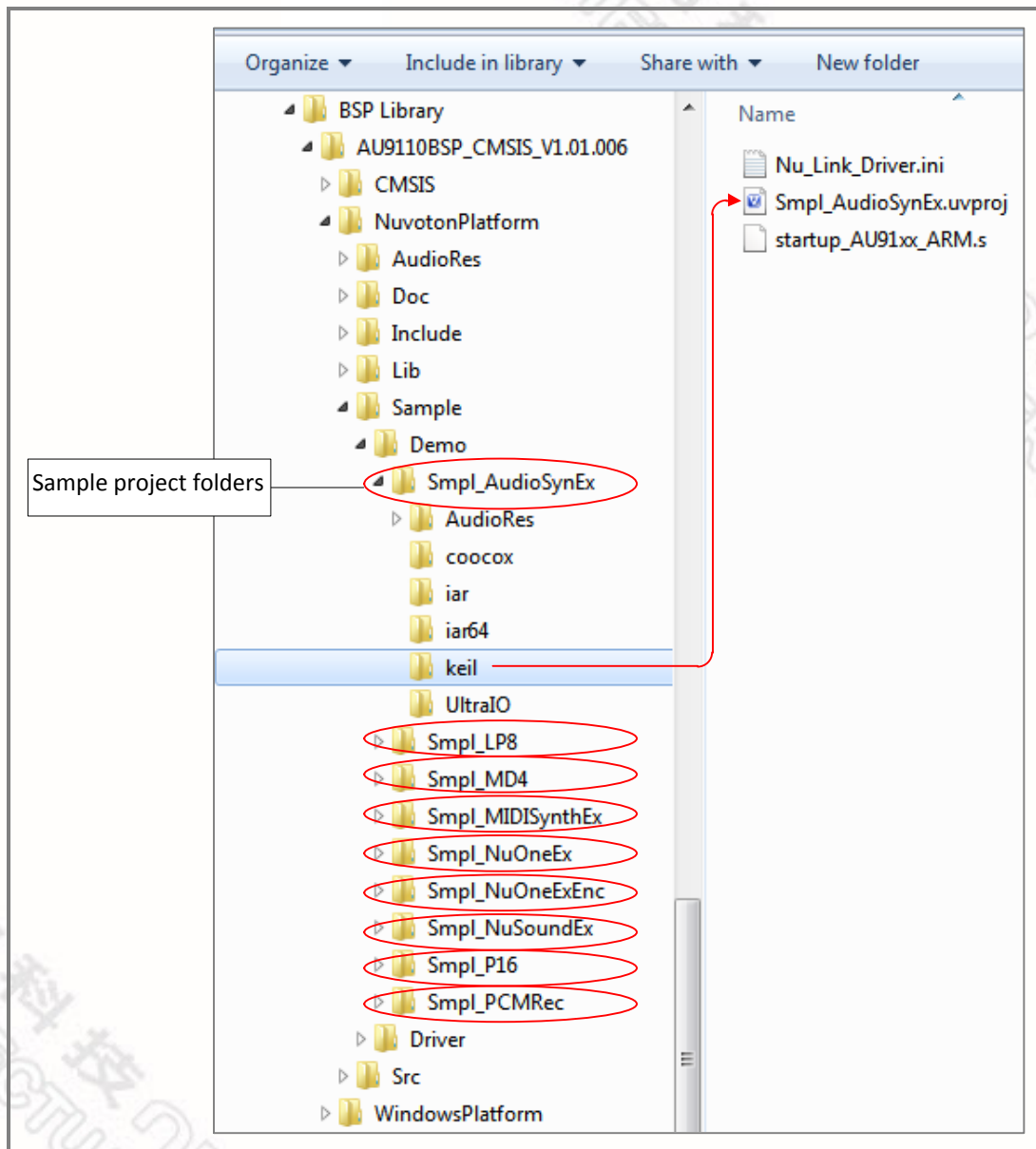

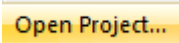
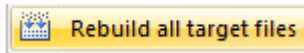
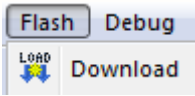


Figure 7: AU9110_BSP Sample Project Directory.

You can use the following procedure to download a sample code to AU9110 chip in the NuTiny-EVB-AU9110. The sample project 'SmpI_AudioSynEx' is illustrated in the procedure only, user can select other desire sample project.

	Actions	Remark
Step 1.	 Click	Start μ Vision IDE
Step 2.	 Open Project...	Open the Smpl_AudioSynEx.uvproj project file
Step 3.	 Rebuild all target files	Compile and link the Smpl_AudioSynEx application
Step 4.	 Flash Debug LOAD Download	Program the application code into on-chip program flash

4 How to Start NuTiny-SDK-AU9110 on the IAR Embedded Workbench

4.1 IAR Embedded Workbench Software Download and Install

Please connect to IAR company website (<http://www.iar.com>) to download the IAR Embedded Workbench and install the EWARM.

4.2 Nuvoton Nu-Link Driver Download and Install

Please connect to Nuvoton company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download Nu-Link driver for IAR ICE. Please refer to the Chapter 6 for the detail download flow. When the Nu-Link driver have been download ok, please unzip the file and then execute the “Nu-Link_Driver_for_IAR_EWARM_Vx.xx.xxxx.exe” to install the driver, where the Vx.xx.xxxx represents the version number of driver.

4.3 Hardware Setup

The hardware setup is shown in Figure 8.

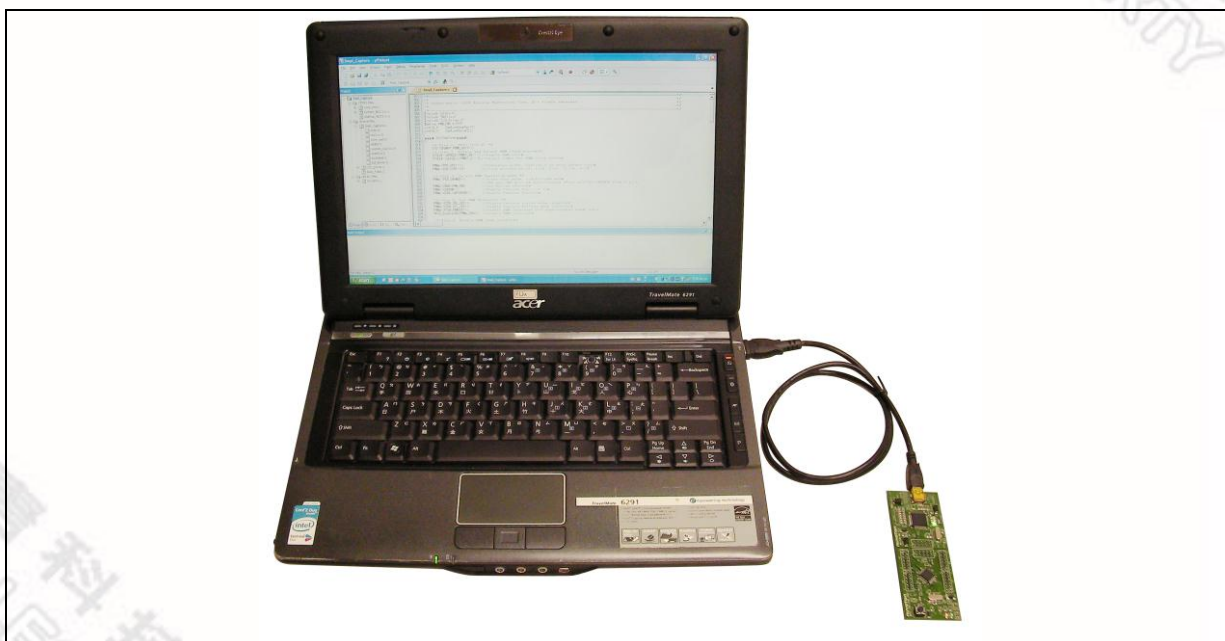


Figure 8: NuTiny-SDK-AU9110 Hardware Setup.

4.4 Run a sample project on IAR platform

When you already install AU9110_BSP in your PC, you can find a iar subfolder in every sample project folder which is shown in Figure 9.

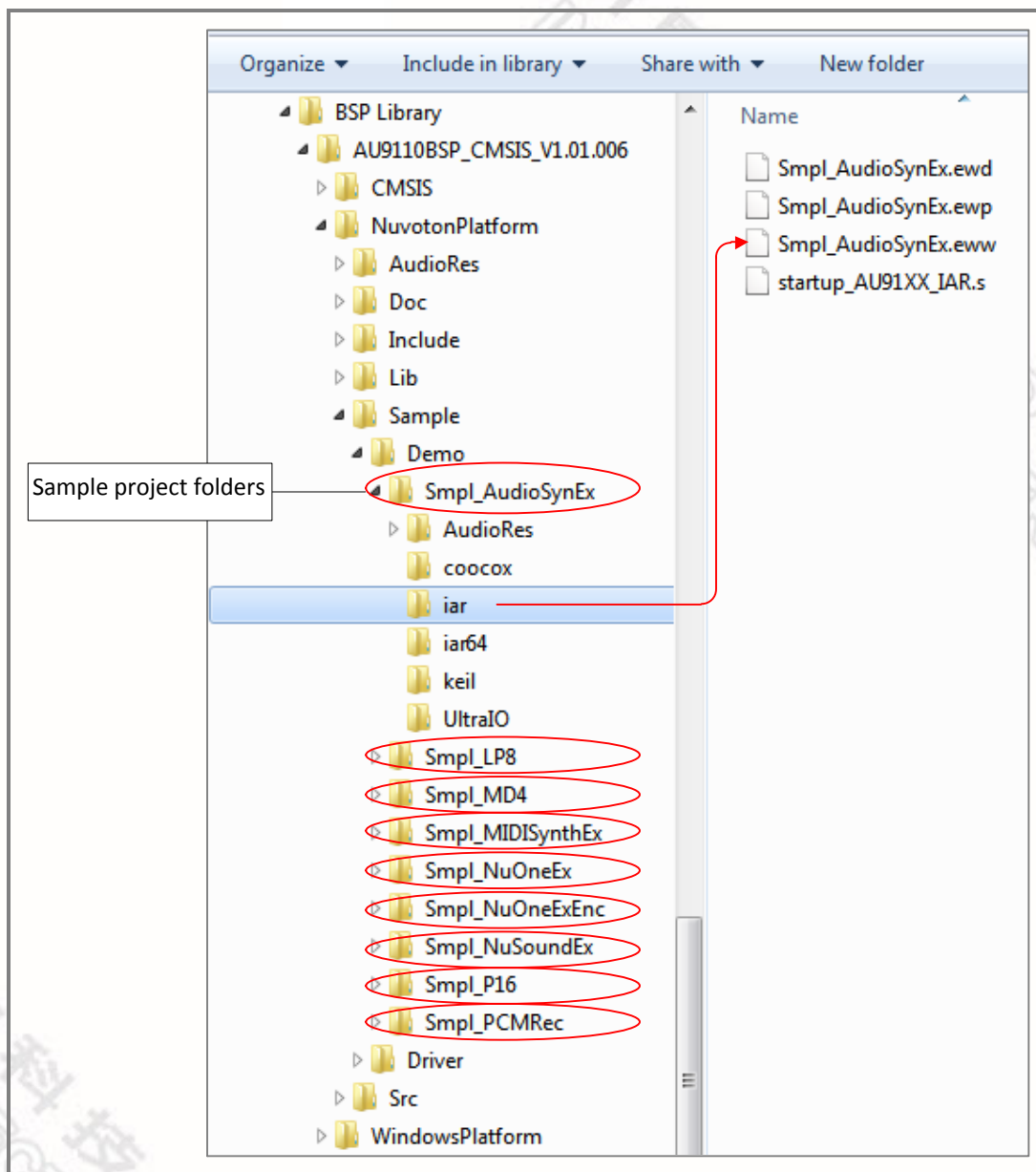
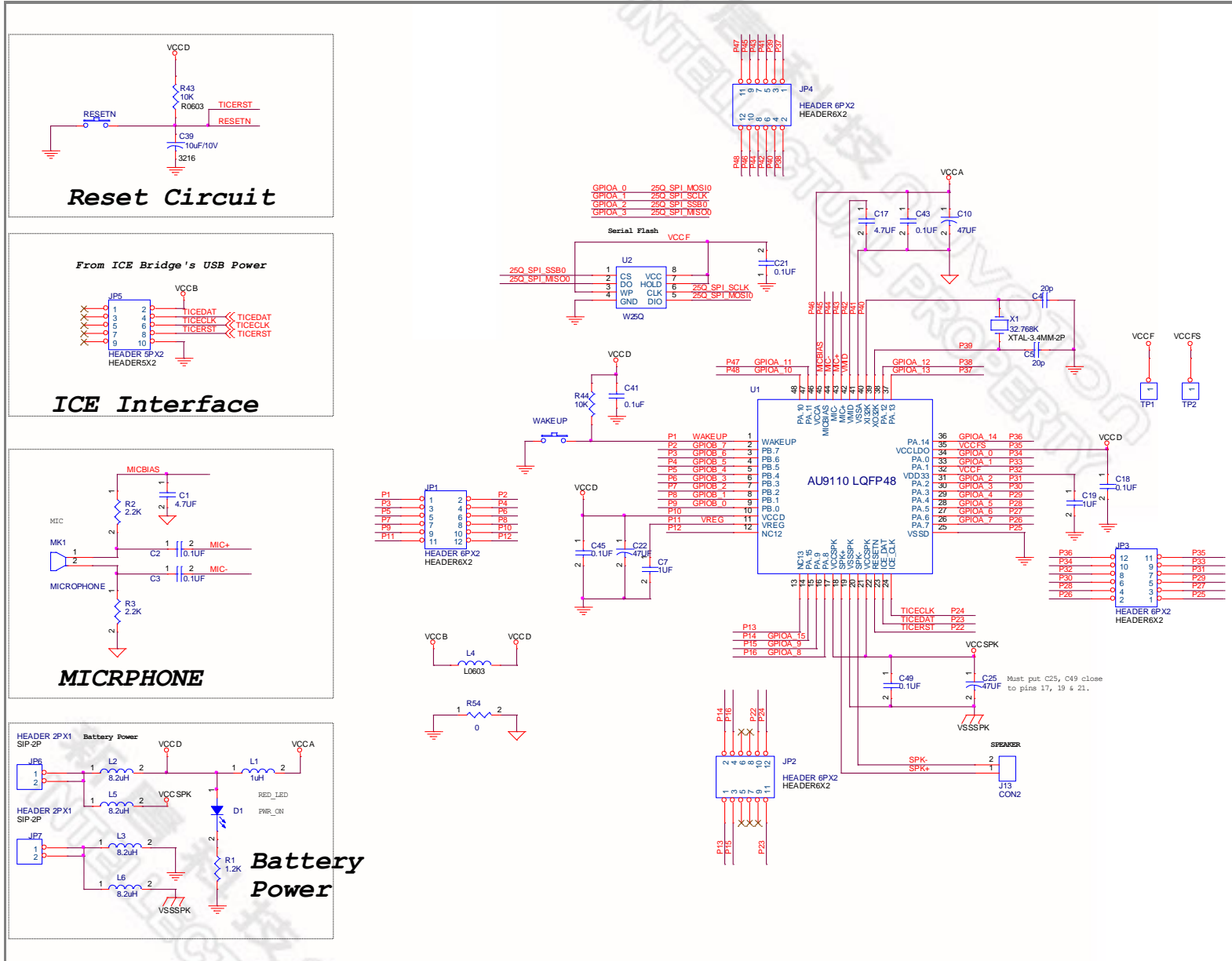


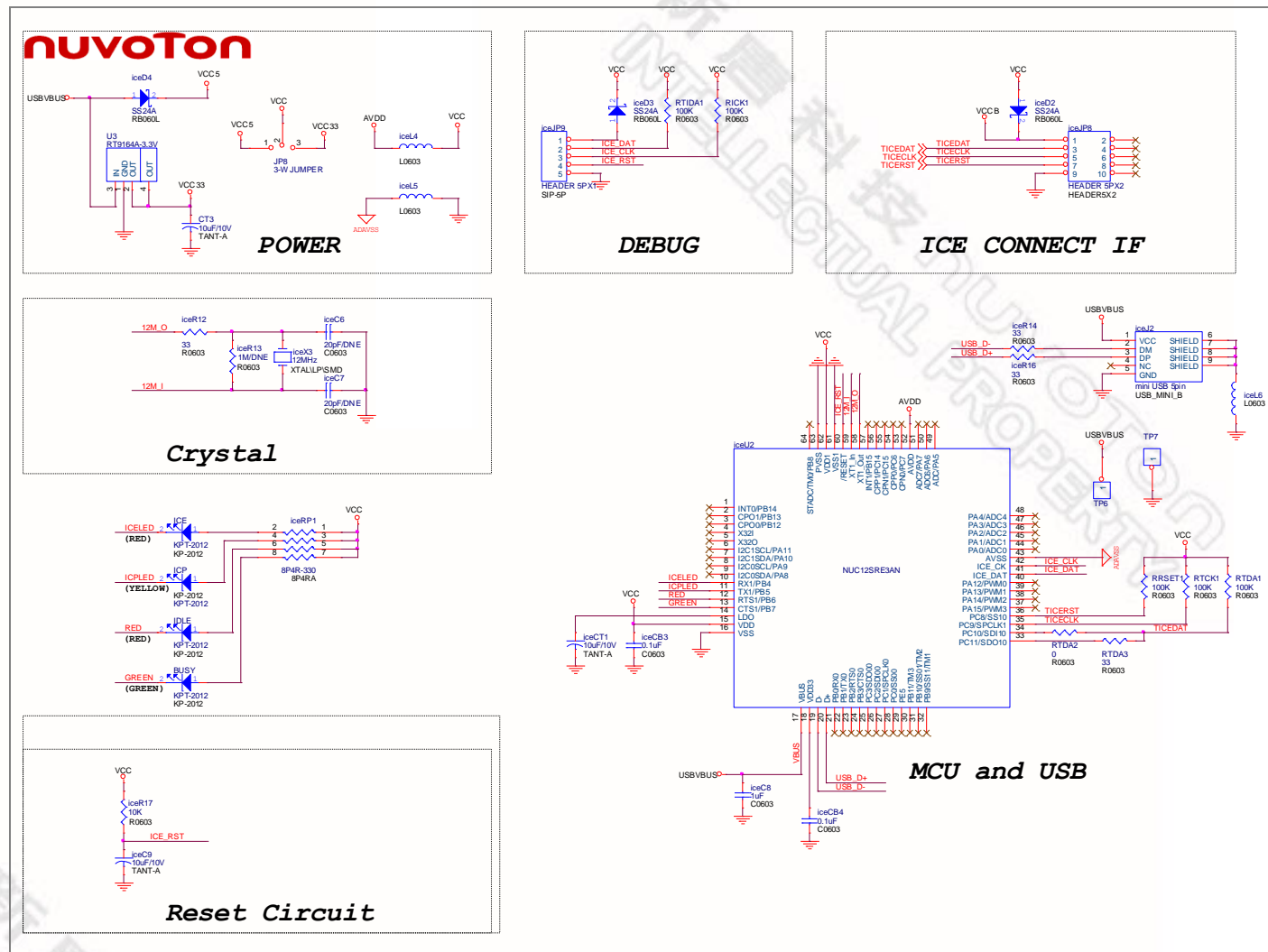
Figure 9: AU9110_BSP Sample Project Directory.

5 NuTiny-SDK-AU9110 Schematic

5.1 NuTiny-EVB-AU9110 Schematic

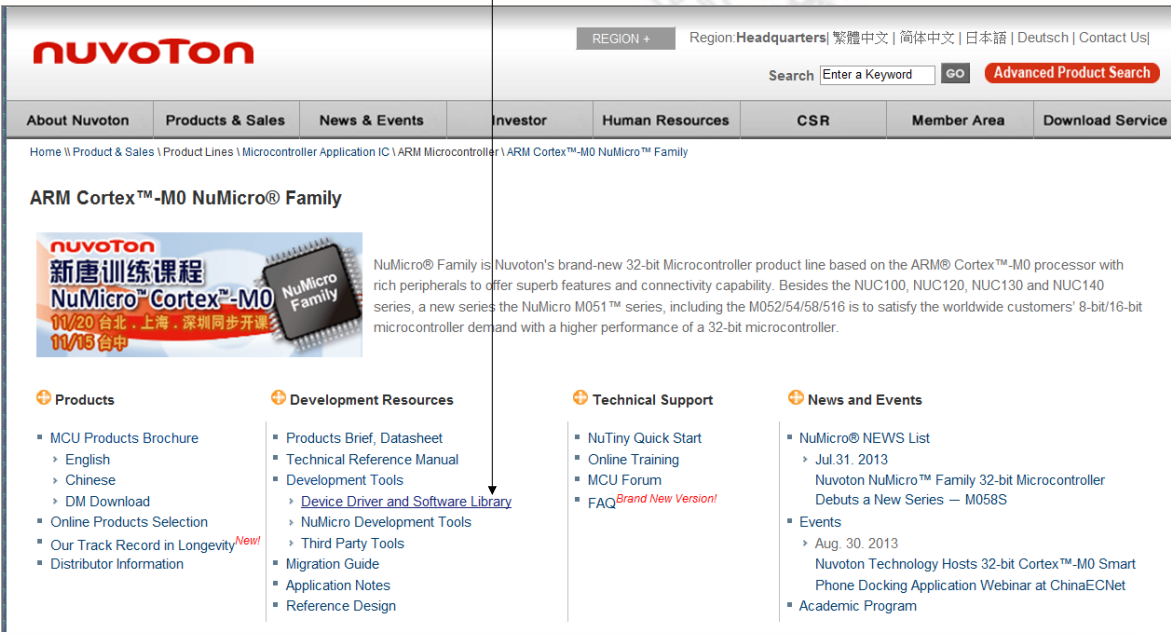














5.2 Nu-Link-Me Schematic



6 To Download NuMicro™ Family Related Files from Nuvoton Company Website

User can download NuMicro™ driver for Keil µVision IDE and IAR EWARM at following procedure.

Step 1.	To visit the Nuvoton NuMicro™ Website: http://www.nuvoton.com/NuMicro												
Step 2.	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Click here to enter Device Driver and Software Library page</div> 												
Step 3.	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">To download NuMicro™ Keil µVision® IDE driver</div> <div style="border: 1px solid black; padding: 5px;"> <p>Nu-Link Driver</p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>  Nu-Link Driver for Keil RVMDK V1.22.6040.zip  Revision History </td> <td>This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.</td> <td>V1.22.6040</td> <td>07-19-2013</td> </tr> <tr> <td>  Nu-Link Driver for IAR EWARM V1.22.6040.zip  Revision History </td> <td>This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.</td> <td>V1.22.6040</td> <td>07-19-2013</td> </tr> </tbody> </table> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">To download NuMicro™ IAR EWARM driver</div>	File name	Description	Version	Date	 Nu-Link Driver for Keil RVMDK V1.22.6040.zip  Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.22.6040	07-19-2013	 Nu-Link Driver for IAR EWARM V1.22.6040.zip  Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.22.6040	07-19-2013
File name	Description	Version	Date										
 Nu-Link Driver for Keil RVMDK V1.22.6040.zip  Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.22.6040	07-19-2013										
 Nu-Link Driver for IAR EWARM V1.22.6040.zip  Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.22.6040	07-19-2013										

7 Revision History

Version	Date	Page	Description
V1.0	Nov. 1, 2013	-	First Release.

Important Notice

Nuvoton products are not designed, intended, authorized or warranted for use as components in systems or equipment intended for surgical implantation, atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, or for other applications intended to support or sustain life. Furthermore, Nuvoton products are not intended for applications wherein failure of Nuvoton products could result or lead to a situation where personal injury, death or severe property or environmental damage could occur. Nuvoton customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Nuvoton for any damages resulting from such improper use or sales.

Please note that all data and specifications are subject to change without notice. All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.